Antibacterial Activity of Twelve Medicinal Plants

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Background

The ever growing bacterial resistance to both conventional and alternative antibiotics renders it difficult to manage infected wounds and abscesses and other infectious diseases. Hence, the aim of this study was to find antibacterial agents from a collection of medicinal plants that have been in use for thousands of years in traditional Sudanese medicine.

Objectives

This study was designed to evaluate the antibacterial effect of 12 medicinal plant extracts on the susceptibility of 5 bacterial species isolated from wounds and abscesses. The bacterial isolates were Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa, Klebsiella sp and proteus vulgaris; and the extracts were taken from Salvia orientalis, punicar granatum (Bark and Wood), Biota orientalism pipar cubeba, Acorus calamus, candulaarvensis, Moringa perigrina, Nauclea lotifolia, Ferula asafetida, Cissus petiolata, and petasites hybridus.

Methodology

The evaluation of bacterial susceptibility to the selected medicinal plants was based on the presence or absence of inhibition zone and zone diameter, using the cup plate agar diffusion method.

For comparative reasons standard Escherichia Coli (NCTC 25922); Staphylococcus aureus (NCTC 25923); Pseudomonas aeruginosa (NCTC 27853); Klebsella sp (NCTC 35657); Bacillus subtillis (ATCC 8236), and conventional antibiotics including Benzylepnicillin, Erythromycin, Gentamycin and Ceftriaxone were used.

Results

The major phytoconstituents of the 12 medicinal plants extracts were identified using standard qualitative methods. Varying numbers and quantities of tannins, flavonoids, cardiac glycoside, phenolic glycoside, anthraquinone glycosidem cyanogenic glycoside and alkaloids were found.

Adopting the standard methods, 100 bacterial organisms were isolated and found to consist of: Gram's negative bacteria(Escherichia colli [20%], Pseudomonas aeruginosa [20%], Proteus vulgaris [18%] and klebseilla sp. [17%]); Gram's positive (Staphylococcus aureus [18%]); and 7% of methicillin–resistant-Staphylococcus aureus (MRSA) which could be considered an alarming level of prevalence.

Methanolic extracts of medicinal plants used against bacterial isolates, showed high sensitivity as Escherichia coli, Pseudomonas aeruginosa, proteus vulgaris, klebsiella sp and staphylococcus aureus

were sensitive to the majority of the tested medicinal plants. This sensitivity was found to be more than that of the benzenic and chloroformic extracts.

Methicillin-resistant Staphylococcus aureus (MRSA) showed sensitivity to all tested medicinal plants extracts. However, Punicar granatum (Bark) gave the highest antibacterial activity followed by Biota orientalis and then anogeissus leiocarpus. These results reveal the potential of these plants as a source of effective antibacterial agents that can treat and possibly eradicate MRSA.

Biota orientalis extracts when tested using agar plate dilution method, have shown the lowest MIC against tested standard bacteria, hence it was considered as a potential wide-sopectt and rum antibacterial medicinal plant extract. Punicar granatum (Bark) showed that it has the highest MIC. Also, it was observed that Bacillus subtilis is the most susceptible to Anogeissus leiocarpus, Punicar granatum (Bark) and Biota orientalis.

Conclusions

This study revealed the need for more studies on the effects of plant extracts on MRSA. Further studies are also needed to explore the activity of benzinic and chloroformic extracts of all tested medicinal plants. The methanolic extract, especially those showing high antibacterial efficacy should be subjected to rigorous testing to determine their usefulness as alternative antibacterial agents.